Fuzing for Global Interoperability

- **Cockpit Programming to Reduce Logistics**
- **Distributed Arming Systems for Missiles**
- **Tolerant Burst Point Control**

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Abstract

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11

Future Cockpit Programming

Present programming

- Mission planning tools program a PCMCIA card
- PCMCIA card sent to fuze programming site or Mission data sent to fuze programming site and program a PCMCIA card
- Setter unit programs fuze on ground
- Fuze's program checksums hand written on weapon
- Weapon loaded onto specific location of aircraft
- In-flight, fuze mission data can be reprogrammed
- Pilot selects proper weapon from aircraft stores
- Launch weapon

Future programming

- Mission planning develops mission data
- Mission data sent to aircraft
- Aircraft programs fuze, including weapon type
- Launch weapon

Cockpit Programming Improvements

- **Reduce Tactical Response Time by eliminating Ground Programming Processes**
- **Increase Reliability of Launching Proper Weapon from Aircraft. Prevent Launching Weapon with Wrong Mission Data at a Target, when can't Interrogate Weapon on Aircraft**
- **Eliminate Hardware, I.e. Ground Setter Unit**
- **Eliminate Training, I.e. Ground Setter Unit Training**
- **Eliminate Maintenance I.e. Ground Setter Unit Maintenance**
- **Increase Fuze Connector Life and Reliability**
  - **Reduce Number of Connections to Fuze**

Cockpit Programming Plan

- **Develop System Safety Approach to program Mission and Weapon Type Parameters**
- **Obtain Safety Board Approval of Approach**
- **Implement Approach**
- **Obtain Safety Board Approval of Design**

Distributed Arming Systems

- **Reason for a Distributed Arming System**
  - **Fuze does not have access to Arming Environments, like when Fuze is buried in a Missile**

- **Core Requirements for Distributed Arming System**
  - **MIL-STD-1316 requires Two Independent Arming Environments that Independently Control Arming**
    - **Hardware only (No Software) in at Least One Arming Environment Path**
  - **Unique Code for Arming**

Examples of Distributed Arming Systems

- **Free-Flight and Guided Bomb Systems**
  - **FMU-139 and FZU-48**
  - **FMU-152 and FZU-55**
  - **HTSF and FZU-60**
- **BAT: Umbilical Separation, Air Stream Sensing, and ESAD**
- **TTPV with a HTSF**
- **CALCM with a HTSF**
- **Others**

FZU Distributed Arming Systems

- FZU detects Two Independent Arming Environments
  - Lanyard Pull
    - Minimum Lanyard Pull Force
    - FZU Time Windows the Turbine Release Arming Environment
  - FZU Powers Fuze with Post Launch Air Stream
- Unique Power & Turbine Release Signals from FZU-48 & FZU-55
  - Positive for Power
  - Negative for Turbine Release
- FZU-60 Power and Turbine Release Frequencies verified with HTSF & MEHTF

Missile Distributed Arming Systems

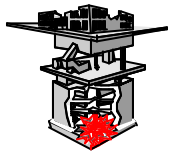
- Missile programs Fuze
- Missile detects Arming Environments
- Missile builds Unique Arm Code with Arming Environment Data
- Missile provides Arming Power to Fuze
- Missile provides Unique Arm Code to Fuze
- Fuze arms after
  - Timing out Arm Time
  - Detecting Unique Arm Code

Unique Arm Code

- **Probability of Occurrence << One in a Million to meet MIL-STD-1316's Less than One in a Million arm before launch for System**
- **Ignores Common signals**
  - **Common power: DC, 110Vac. 60hz; 110Vac, 400hz**
  - **Low Frequency Guidance Signals**
- **Provides Immunity to Electromagnetic Environments**

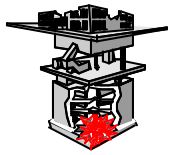
  (HERO, EMV, Other)
- **Built using arming environments like**
  - **Launch**
  - **Deployment of Air Surfaces**
  - **Post Launch Air Stream or Engine Power**
  - **Other**

Tolerant Burst Point Control



- **Void Detection of HTSF and MEHTF provide Accurate Depth of Burial for**
  - **Varying Overburden**
  - **Multiple Voids**
  - **Unknown Void Lengths**

HTSF & MEHTF Void Burst Point Control



- **Void depth of burial makes target defeat economical with Tolerant burst point control**
- **DOB from void entry fires warhead in void without accurate target intelligence**
  - **Prevents fires before and after voids**
  - **Reduces DOB errors from variations in overburden, impact angles, angle of attack, impact velocity, and warhead turning during penetration**